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17. ABSTRACT (MAX. 250 WORDS)

A staff paper describing a 5-year moving average technique for the projection of college enrollments in Wisconsin as part of a continuing study for more accurate techniques and methods for the projection of enrollments. Points out minor variations of this average and discusses the accuracy of the projections. The projections determined by this technique help establish building needs in the State.

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Joint Staff Study
January, 1962

ENROLLMENT PROJECTIONS

For the purpose of establishing building needs, the Joint Staff has projected enrollments on the basis of a "Five-Year Moving Average". As part of the continuing study for more accurate techniques and methods for the projection of enrollments, this paper describes the Five-Year Moving Average, minor variations of this average, and the accuracy of projections based thereon.

The technique of the Five-Year Moving Average is illustrated below: (The figures therein are fabricated for easier interpretation.)

Year	No. of 18-21 yr. olds in Wisconsin	Actual College Enroll.	% Enrollment of 18-21 yr. olds	% Change from prev. yrs.
1	200,000	20,000	10.0	
2	210,000	20,000	9.5	- .5
3	220,000	21,000	9.6	+ .1
4	250,000	21,000	8.4	-1.2
5	240,000	25,000	10.4	+2.0
6	260,000	28,000	10.8	+ .4
			Algebraic Sum of % Change	+ .8
			Average (5 years)	+ .16
7	280,000	[30,688]	10.96	

In order to project the enrollment for year "7", the average change over the previous five years is computed. This average is then added to the ratio of the actual enrollment to the 18-21 year old pool for year "6". The resultant percentage is applied to the pool of year "7" to obtain a projected enrollment.

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The source from which the 18-21 year old pool is commonly obtained is Thompson's "Enrollment Projections for Higher Education, 1961-1978" *. Because Thompson's projections involve but 18-21 year olds 1961-1978, and since previous editions have not involved 18-21 year olds previous to 1950, the source for the 18-21 year olds pool for the purposes of this paper was "Wisconsin College Enrollments ~~- The Past and Present~~ Trends and Projections" **.

It should be pointed out that for building purposes, the Joint Staff has only used two-thirds of the "Five-Year Moving Average" in order to provide a projection which is conservative. Also, it is important to note that the enrollment projections for building purposes are made only for a five-, ten-, and 15-year period rather than a year by year projection. Because any evaluation of a system should require a series of estimates to compare with actual enrollments, and because the enrollments in the years after 1952 were relatively unaffected by returning "veterans", it was decided that a year by year projection would be used in order to determine accuracy. The following tables indicate the projections based on two-thirds of a "Five-Year Moving Average" for the University of Wisconsin, Madison, and the State Colleges.

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* Thompson, Ronald B. "Enrollment Projections for Higher Education 1961-1978. The American Association of Collegiate Registrars and Admissions Officers, September 1961, 36 pp.

** ~~Little, J. Kenneth~~ Lins L.J. "Wisconsin College Enrollments ~~- The Past and Present~~ Trends and Projections", a report to Wisconsin Association of Collegiate Registrars and Admissions Officers, ~~1954, p. 24~~ 1955, 40 pp.

TABLE I

UNIVERSITY OF WISCONSIN, MADISON

Year	Actual Enrollment	Projection*	Difference
1952	13,571	13,233	- 338
1953	13,346	12,965	- 381
1954	13,954	12,803	-1151
1955	15,134	13,843	-1291
1956	15,918	15,385	- 533
1957	15,929	16,320	+ 391
1958	16,590	16,367	- 223
1959	17,433	17,178	- 255
1960	18,811	18,498	- 313
1961	20,118	19,954	- 164

* Based on two-thirds of "Five-Year Moving Average".

TABLE II

WISCONSIN STATE COLLEGES

Year	Actual Enrollment	Projection*	Difference
1952	6,457	6,302	- 155
1953	6,686	6,296	- 390
1954	7,924	6,619	-1305
1955	9,851	8,083	-1768
1956	11,304	10,376	- 928
1957	12,072	12,054	- 18
1958	13,686	12,926	- 760
1959	14,388	14,783	+ 395
1960	15,644	15,800	+ 156
1961	18,577	17,006	-1571

* Based on two-thirds of "Five-Year Moving Average".

In order to justify the use of any system, it must be determined whether a particular system is accurate and whether it is relatively simple to apply. A statement as to the accuracy of a technique must take into consideration its comparative as well as its absolute degree of discrepancy from the actual. Also, in general, if two systems are equally accurate, the more simple of the two is chosen as the more useful. In this report, all the techniques used were of the same, or nearly the same, simplicity so as to make such factor unimportant.

The variations of the present method for projecting enrollments for building purposes which were considered:

1. The use of a different proportion of the average -- e.g., 3/4 instead of 2/3.
2. The use of a different basis -- e.g., a seven-year average instead of a five-year average.

With reference to (1) above, the proportional amounts to be considered could most easily be determined after the fact; that is, if the full average would consistently overestimate the actual enrollment, the proportion which would properly reduce the projection could be easily computed. The projections which follow use a full average.

TABLE III

UNIVERSITY OF WISCONSIN, MADISON

Year	Actual	4-Yr. Ave.	Diff.	5-Yr. Ave.	Diff.	7-Yr. Ave.	Diff.
1952	13,571	12,808	- 763	13,018	- 553		
1953	13,346	12,549	- 797	12,728	- 618		
1954	13,954	12,539	-1415	12,561	- 393	12,805	-1149
1955	15,134	13,939	-1195	13,685	-1449	13,726	-1408
1956	15,918	15,737	- 181	15,391	- 527	15,075	- 843
1957	15,929	16,067	+ 138	16,456	+ 527	15,925	- 4
1958	16,590	16,632	+ 42	16,504	- 86	16,172	- 418
1959	17,433	17,313	- 120	17,356	- 77	17,172	- 261
1960	18,811	18,544	- 267	18,675	- 136	18,635	- 176
1961	20,118	20,079	- 39	20,114	- 4	20,248	+ 130

Year	Actual	8-Yr. Ave.	Diff.	9-Yr. Ave.	Diff.	10-Yr. Ave.	Diff.
1952	13,571						
1953	13,346						
1954	13,954						
1955	15,134	13,813	-1321				
1956	15,918	15,106	- 812	15,168	- 750		
1957	15,929	15,857	- 72	15,877	- 52	15,923	- 6
1958	16,590	15,970	- 620	15,909	- 681	15,928	- 662
1959	17,433	16,953	- 480	16,765	- 668	16,703	- 730
1960	18,811	18,540	- 271	18,331	- 480	18,149	- 662
1961	20,118	20,156	+ 38	20,083	- 35	19,887	- 231

TABLE IV

WISCONSIN STATE COLLEGES*

Year	Actual	4-Yr. Ave.	Diff.	5-Yr. Ave.	Diff.	7-Yr. Ave.	Diff.
1952	6,457	6,119	- 338	6,288	- 169		
1953	6,686	6,231	- 455	6,247	- 439		
1954	7,924	6,425	-1499	6,597	-1327	6,693	-1231
1955	9,851	8,266	-1585	8,103	-1748	8,165	-1686
1956	11,304	10,669	- 635	10,562	- 742	10,403	- 901
1957	12,072	12,595	+ 523	12,381	+ 309	11,896	- 176
1958	13,686	13,492	- 194	13,294	- 392	12,884	- 802
1959	14,388	15,665	+1277	15,234	+ 846	16,829	+2441
1960	15,644	16,028	+ 384	16,213	+ 569	16,113	+ 469
1961	18,577	17,235	-1342	17,346	-1231	17,557	-1020

Year	Actual	8-Yr. Ave.	Diff.	9-Yr. Ave.	Diff.	10-Yr. Ave.	Diff.
1952	6,457						
1953	6,686						
1954	7,924						
1955	9,851	8,289	-1562				
1956	11,304	10,343	- 961	10,376	- 928		
1957	12,072	11,915	- 157	11,852	- 220	11,867	- 205
1958	13,686	12,926	- 760	12,939	- 747	12,878	- 808
1959	14,388	14,684	+ 296	14,518	+ 130	14,520	+ 132
1960	15,644	15,982	+ 338	15,887	+ 243	15,627	- 17
1961	18,577	17,700	- 877	17,340	-1237	17,150	-1427

* Projections are all based on full average rather than a proportion of the average.

In order to evaluate each of the series of projections, it is necessary to define a good projection. Certainly, a projection which matches the actual enrollment is desired. However, it is not expected that they match nor is it necessary. If the projection is relatively close to the actual, the projection can be considered good. What is relatively close? For the purposes of this paper, a number of categories have been defined: Excellent, Very Good, Good, and Not So Good. In setting the limits of each category, consideration was given to the conservative approach to projection. That is, an estimate less than the actual is preferred over an estimate higher than the actual. The categories:

1. Excellent -- Within 1% of the actual.
2. Very Good -- Within the range of 1% to 2% but not higher than the actual.
3. Good -- Within the range of 2% to 3% but not higher than the actual.
4. Not So Good -- All not falling into categories (1), (2) and (3).

The last five years of each series of projections has been characterized according to the categories above. This characterization follows:

TABLE V

UNIVERSITY OF WISCONSIN, MADISON

Method	Category			
	Excellent	Very Good	Good	Not So Good
2/3 of 5-Yr. Ave.	1	3	0	1
Full 4-Yr. Ave.	4	1	0	0
Full 5-Yr. Ave.	4	0	0	1
Full 7-Yr. Ave.	3	1	1	0
Full 8-Yr. Ave.	2	1	1	1
Full 9-Yr. Ave.	2	0	1	2
Full 10-Yr. Ave.	1	1	0	3

TABLE VI

WISCONSIN STATE COLLEGES

Method	Category			
	Excellent	Very Good	Good	Not So Good
2/3 of 5-Yr. Ave.	2	0	0	3
Full 4-Yr. Ave.	0	1	0	4
Full 5-Yr. Ave.	0	0	1	4
Full 7-Yr. Ave.	0	1	0	4
Full 8-Yr. Ave.	0	1	0	4
Full 9-Yr. Ave.	1	1	0	3
Full 10-Yr. Ave.	2	1	0	2

Following the procedures of decision-making theory, each of the categories has been weighted:

Excellent	5
Very Good	3
Good	1
Not So Good	0

The application of the utilities to Tables V and VI provides the entries for the following table.

TABLE VII

	2/3	4	5	7	8	9	10
University of Wisconsin	14	23	20	19	14	11	8
State Colleges	10	3	1	3	3	8	13
Total	24	26	21	22	17	19	21

Thus, the relative merits of each of the techniques has been established for each of the two institutional categories. From the table, it appears that the full four-year average has the best past record for University projections--the ten-year average has the best past record for State College projections.

The search for more accurate techniques will continue. Presently, the Joint Staff is investigating the relationship of high school graduates and freshman classes at both the state and regional levels. Holding power is also of concern. The results of these as well as other investigations will be reported in future papers.